THE Chemist

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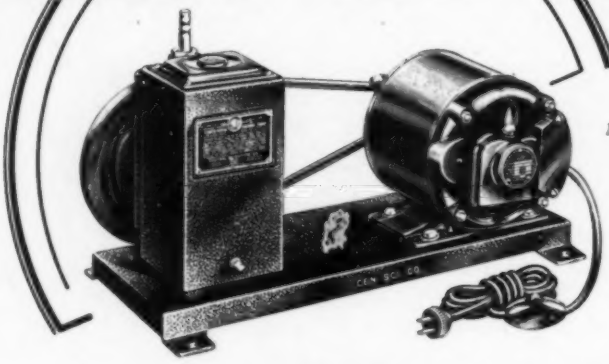

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The Chemist

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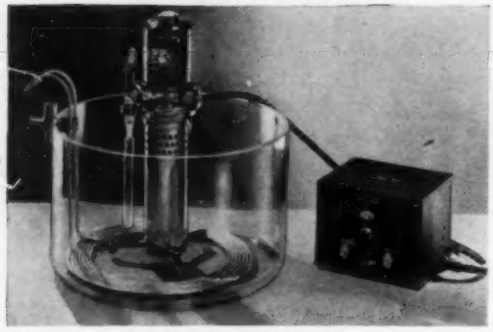

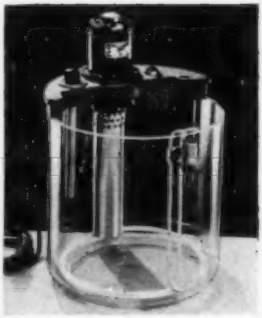

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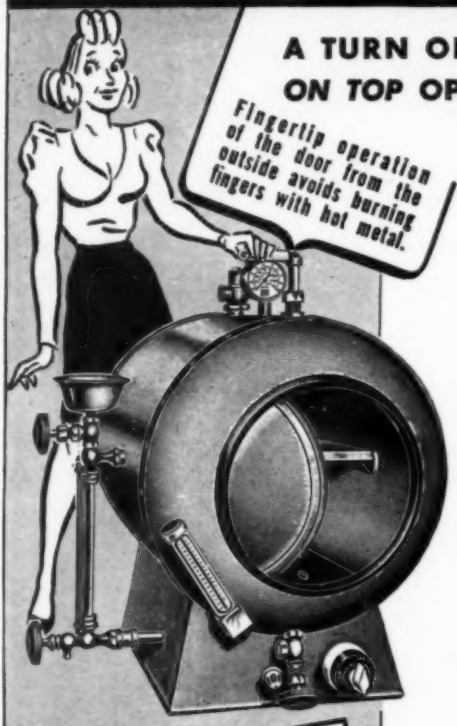

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That "chlorine in powder form" which Ernie Pyle speaks of is, of course, high test calcium hypochlorite, and, as likely as not, it's Mathieson HTH. That soda ash, too, is probably fused soda ash in tablet form made by Mathieson especially for use by our armed forces overseas.

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Paint Industry at War Acquires Sound Foundation for Future

V. C. Bidlack

Assistant to the President, McCloskey Varnish Company, Philadelphia, Pa.

CONVERSION of the production side of the paint industry from peace to war carried with it unlimited responsibilities which were shared by every chemist in the protective coating field throughout this and other nations. All progress incident to beauty and protection was promptly shelved for the demands of utility and production for the material of war.

The paint business was not altogether unprepared for such a change and its custodians were familiar with existing government requirements and specifications. But, a variety of new equipment, new designs and a production goal that staggered the imagination flooded technicians with many problems which were not only complicated but had to be solved in the shortest time possible.

Fortunately, through both affiliated Production Clubs and the Scientific Section of the National Association, the Armed Forces had at their command invaluable assistance and a wealth of information to supplement their own efforts in the design of new and unusual coatings and in the improvement of current specifications, for everything that flies, fights, or floats.

Production, also, has kept pace with delivery schedules with but few exceptions and then the strategic nature of certain raw materials has made delays unavoidable.

Second only to these tasks of first importance, the paint technician was simultaneously confronted with the problem of devising substitute or alternate products for civilian requirements with many of the prime raw materials either limited in quantity available or unobtainable for other reasons.

Large percentages of the drying oils used in this country are imported and the regular flow of these oils from all parts of the world is required to satisfy normal consumption. However, considerable progress in drying oil technology has resulted in the extended use of many semi-drying and softer oils which heretofore were considered undesirable for film coatings. Formulation with and evaluation of

these modified oils has been necessary before general acceptance by the industry.

There have been and still are some shortages in pigments due chiefly to the fulfillment of government orders being greater than the production capacity or because the raw metals are in demand for other war purposes.

Synthetic resins, solvents and lacquer ingredients all require high priorities and their uses are curtailed and limited to direct or indirect government business.

Providing satisfactory replacements for such a wide variety of raw materials affords an excellent measure of the value of chemistry when paint goes to war. The fact that both war and civilian demands have been met adequately under circumstances of great difficulty is a commendable record for the pages of paint history.

The conversion from War to Peace will carry even a greater challenge to those men who have the burden of process and development on their shoulders.

The items which must be considered in meeting this challenge may be arranged conveniently into three groups:

Raw Materials: The release of many products which heretofore have not been available in quantities will be seeking new markets. Such high-powered solvents as the nitroparaffins will permit the use of different types of film forming solids than before and a whole new field of synthetic resins and complex chemical bases immediately become interesting, including copolymers, elastomers and cellulosic compositions. The intermediates incident to the manufacture of synthetic rubber also have tremendous possibilities when used to re-enforce drying films while "Dispersion Resins" of exceptional durability and fast-drying properties may well become necessary ingredients in many industrial finishes.

Finished Products: The ultimate uses of new raw materials depend largely on the practical value of the final products of which they become a part. Therefore, any survey of new basic materials must be undertaken from that viewpoint.

Future changes in design and new materials of construction will require modernized coatings that are different in both application and performance. As a direct result of the production facilities for the war, it is generally agreed that the widespread use of light alloys, plastics, and bonded plywood will follow in the building trades and for manufacturing purposes. The finishing and maintenance of these surfaces present an interesting and profitable field for research and development with the requirements being more exacting than for steel, ordinary

lumber, and mineral siding.

Manufacture: The fast tempo of producing economically in an industry geared for war will continue through the post-war period when efficient handling methods must be employed if our economy is to become balanced.

Organic binding media produced on a large scale will tend to supplant the small-batch custom-built vehicles of the past. The controlled manufacturing methods used for resin solutions can and will be adopted in the processing of oils and varnishes.

The chemical pre-treatment of oils or their fatty acids under heat as intermediates for the industry is now an accepted procedure by many who formerly relied on the unique properties of china wood for kettle results. The effective use of these intermediates will necessitate rearrangement of schedules and layouts in many plants.

Incorporating pigments with vehicles has always been a bottle-neck problem in the manufacture of paints and enamels. High speed stone and roller mills and ball, pebble and colloidal mills have made heavy war production of pigmented products possible. Additional improvements in all these types are anticipated with the possibility of vacuum mixers, continuous feeders, and milling at elevated temperatures with easier wetting pigments and improved dispersing liquids. Adaptation of equipment and mechanical methods employed in other industries will receive careful consideration in protective coating production plans for the future.

Thus, an industry at war has acquired a sound foundation for the peace and will again cultivate the fields of changing markets and will harvest the fruits of a job well done.

The engineering division of the Jeffersonville Quartermaster Depot, Army Service Forces, Jeffersonville, Indiana, has completed a laboratory training program for personnel in a series of seminars on physical and chemical testing of various products. Officers at the Depot say that this program of training is of great value to the progress and efficiency of the Division and the Depot.

Carl Shipp Marvel, professor of organic chemistry at the University of Illinois, has been elected president of the American Chemical Society for 1945.

Clair C. Catherman, F.A.I.C., is now chemist with the Master Tire and Rubber Corporation, Findley. Ohio.

Tantalum Enters Surgery

I. R. McCall

Fansteel Metallurgical Corporation, North Chicago, Illinois

TANTALUM, the seventy-third element of the periodic series, occuring in Group V, is one of the most interesting and promising of metals. It has a unique combination of properties not possessed by any other metal or alloy. In its important fields of use, it is virtually without a substitute or equivalent.

The best-known characteristic of tantalum is its resistance to corrosion and chemical attack, in which respect it is the full equivalent of glass, with the added advantages of the strength, workability, and malleability of steel.

Tantalum has been used for a number of years in equipment for processing acids and other corrosive chemicals—both inorganic and organic.

Although a small amount of tantalum was made in Germany from 1903 until the beginning of World War I, the metal was first produced on a commercial scale in 1922. The first use of the new metal was found almost immediately in battery chargers and eliminators for battery-operated radio receivers in use at that time.

Research and development extended the use of tantalum to many varied applications, including chemical process equipment, anodes, grids, and other parts for electronic tubes, carbide tools and dies, and recently, optical glass for camera lenses.

Tantalum is inert to almost all acidic organic and inorganic compounds. It is not attacked by boiling aqua regia, chlorine, bromine, iodine, or any of their acid compounds, at ordinary temperatures and at atmospheric pressures.

Hydrofluoric acid, fuming sulphuric acid, alkalis, and a few other chemicals will attack tantalum.

Physically, tantalum is a blue-gray metal with most of the properties of mild steel. In its annealed state, it is extremely ductile and workable. Wire may be tied in tight knots or twisted. Sheet is easily formed to desired shapes and contours. The metal is easily sheared, punched, pierced, drilled or machined.

Tantalum's resistance to acid

chemistry and its physical characteristics led to research to determine its value in surgery. The initial studies, conducted at Vanderbilt University, indicated that a metal apparently biologically inert had been found—a quality sought by the surgical profession since metals were first introduced into living tissue by Petronius in 1565.

Research was, or is being conducted at the University of California, the University of British Columbia, the Montreal Neurological Institute, Northwestern University, Columbia University, University of Chicago, U. S. Naval Medical Research Institute, and by many individual investigators.

Foreign body reaction is well known to the surgeon and histologist. Over-growth of tissue, due to the presence of metallic and other foreign substances, has been accepted as a matter of course. Such reactions are not present where tantalum is used to repair fractures or to close wounds. This has been confirmed many times.

Where tantalum has been used in connection with bone repair, a normal bone growth without the characteristic callous has been observed. A fine bluish-white film develops, starting at the edges of the metal, gradually covering it. This film is probably collagen — bone growth follows naturally after this growth.

In soft tissue, little or no foreign body reaction has been observed.

The most interesting observation of these phenomena is in the case of skull plates. After implantation onto a ledge between the inner and outer plates of the skull and beneath the pericranium, the injury was repaired with natural bone growth covering the under side of the metal plate. No such growth was noted on the opposite side. In the original test the pericranium in the animals was removed, which may account for the absence of bone formation on the external side. We have had reports of cases where it was necessary to remove a plate three or four months after the operation and found a beautiful development of bone growth starting at the edges of the plate on the under side but no bone growth on the external side.

We have also had reports of tests that may be of greater interest. It has been said that muscular cells will not attach themselves to any foreign substances. We have evidence that fibroblastic cells do grow to tantalum with subsequent tissue attachment.

A tantalum pin has been implanted in the tooth cavity of a dog immediately on removal of the tooth, and after six weeks, x-ray reveals the growth of bone toward the distal end of the pin. This is contrary to the findings of most investigators using other metallic sub-

stances, who report a slight depression around the pin tolerated by chemistry of the mouth, and an osteomyelitis around pins of metals that proved to be toxic.

The most interesting part of this experiment is the adherence of the soft tissue to the tantalum. Metallurgists, we know, say adherence to dense grained structure of metals is not possible, particularly if the surfaces are polished or smooth. Our observations show good adherence of the gum tissue to the metal.

A portion of the palatine process of the maxilla was removed from a number of dogs and tantalum plates .015 inch thick inserted. The stitches tore out on the initial experiment. It was desirable to observe tissue changes due to a constant irritation; no repair was therefore attempted. The flap was absorbed in a short time. The bright metallic surface of the plate is easily seen, the soft tissue is tightly adhered to the metal and there is no pumping of air or draining of liquids from the nose.

Several cleft palates in humans have been repaired as a result of these experiments. In each case the patient has had artificial dentures fitted and reports a complete absence of pumping or draining. They do have to learn to enunciate properly, since the nasal sounds to which they have been accustomed are absent.

Cases of facial paralysis have been materially relieved by the use of small pieces of tantalum sheet made in the form of saddles and tantalum wire fixed in a position to pull the corners of the mouth to a normal position. These patients express much gratitude for this operation. It makes them look like their neighbors and prevents the familiar drooling.

The histology of tissue exposed to tantalum is also interesting. As you know, specimens containing metal cannot be sectioned. The metal must be removed and delicate tissue structures are unquestionably torn on removal of the metal. We have reason to believe this objection has been met and that interesting reports on cell growth onto tantalum surfaces will be forthcoming. We are at liberty to state that the growth of such cells to tantalum has been demonstrated several times at one of the U. S. Army medical centers.

Published reports to date indicate a "marginal gliosis" in brain tissue where tantalum clips were used. Fine tantalum wire has been introduced longitudinally in the sciatic nerve of animals for varying periods of time. After the wire has been removed the nerve sectioned and mounted investigators report they are unable to locate the opening left by the tantalum wire.

This has led to definite applications in neurosurgery. Tantalum

sheet .015 inch, .0125 inch and thinner is used effectively in the repair of skull defects. Some operators are making closures at the time of the initial operation where there is no infection or pathology requiring a different technique. Cases requiring careful plastic repair necessitate the pre-forming of the metal plate, which requires a two-stage operation.

It is not our intention to recommend surgical technique. However, the forming of metal sheet to specific contours is of particular interest.

It has been stated many times that tantalum sheet can be shaped and formed in the operating room. Experience has taught that this is true in a limited sense. For good plastic work most operators prefer to do the forming prior to the operation.

Those familiar with the forming of sheet metal by hammering will have little trouble in making tantalum sheet into skull plates. Numerous requests have emphasized the importance of developing other means to form the sheet to specific contours. We have tried many ways, and have prepared specifications on processes that will simplify the operation considerably. Copies of these specifications are available to those interested.

Experience also emphasizes that the plates should be wired or fixed in some manner to prevent slipping out of position. Some operators recommend that small triangular tags be left on the lower margin of the plate, which are inserted into notches fashioned between the two plates of the skull. The sutured scalp holds the plate securely in position. If the operator prefers using wire, we recommend No. 30 or No. 27 wire for this purpose. Pins can also be made of No. 22 wire.

Tantalum foil has been used in brain operations to prevent adhesions and fixation during healing process. Reports indicate that the histology of the tissue on the side protecting the brain tissue is arachnoid, while the opposite side is connective tissue.[1] The first report of a case where foil was used for this purpose described a rattling sound on the pulsation of the brain. The foil used in similar operations results in no complaints of such disagreeable noises. One patient said he could hear faint sounds with the head in one position. That man has been returned to military duty.

Tantalum foil is also used as cuffs in the repair of nerves and tendons. Here, also, the purpose is to prevent adhesions and fixation during the healing process. The fragile nature of the foil requires careful handling to obviate tearing.

[1] Pudenz, Robert H., and Odom, Guy L.: "Meningocerebral Adhesions," *Surgery*, Vol. 12, No. 2, Aug. 5, 1942.

Two or three curved hemostats can be used to pull the foil beneath repaired nerve or tendon, lapping one edge of the foil well over the other and suturing at the proximal and distal ends. Dr. Spurling has designed a pair of curved forceps that will grip the length of the foil.

During convalescence and after motion has been established, the foil may fragment, which is explained by a work hardening of the metal from repeated flexing. Experience shows this produces no irritation to the tissue nor is there any migration of the pieces. Each piece is covered with a collagenous film. The characteristic foreign body reaction is absent.

Two sizes of tantalum wire, Numbers 36 and 33 (.005 inch and .007 inch diameter) are used as sutures for tendons and other soft tissues. Sutures of Numbers 40 (.003 inch dia.), 36 (.005 inch dia.), and 33 (.007 inch dia.) wire will be furnished in eighteen inch lengths and attached to eyeless, full curved, cutting needles of stainless steel by well known manufacturers.

The use of tantalum wire and sheet in plastic surgery has developed many interesting results. That the imagination of the plastic surgeon can run riot with a reasonable chance of success can be appreciated when reports on many cases are read.

Soft and osseous parts of the nose as well as other parts of the face have been re-formed. Since the fine wire leaves no scar, it is of particular interest to the plastic surgeon. Plates can be formed of the thin sheet in the same manner as skull plates are formed.

Orthopedic surgery offered the initial opportunities to determine the value of tantalum in surgery. We are indebted to Dr. John C. Burch and Dr. John Carney of Vanderbilt University for bringing these exceptional qualities of tantalum to light. We have their reports on cases of fractures of the femur-tibia, fibula, humerus, patella and mandible, that have been repaired with tantalum fixation plates, screws and wire. Some of these cases date back three or more years, with the metal still in position.

Fixation plates have been used by Army and Naval surgeons who have in a few instances removed them after their usefulness ceased to exist. One patient (an officer) insisted on the removal. The surgeon had some difficulty, for the bone was tightly adhered to the screws and the plate. This is readily seen in the scoring of metal plates.

An arch type fixation plate is so designed as to give maximum rigidity with the minimum of weight. Mechanical principles have been used, employing three curves to make the plate rigid. Distortion of

these curves by pressure of the screws exerts a downward and inward pressure the full length of the plate at the edges, thus we have three points of fixation—two edges and the screw itself. This naturally reduces torsion to a minimum. The use of slots allows some latitude in drilling.

The general surgeon is showing interest in tantalum also. Sutures of wire, small pieces or tubing for common bile duct and other similar operations have been used or discussed. Considerable interest is being shown in the use of tantalum wire mesh for the repair of recurrent hernia. This has been tried with stainless steel, only to have the screen fragment by work hardening. Tantalum wire has the same characteristic and can not be so used.

One surgeon did not allow this to deter him. He used a piece of tantalum sheet punched full of 1/8 inch holes. The edges were turned to prevent cutting and the soft tissue was sutured to the plate in a number of places. If the soft tissue will grow to the plate and new tissue develops on either side to give good protection, the surgeon hopes to remove the plate, thus finding a new way to repair the abdominal wall.

Scuderi flanges for the reduction of fractures of the neck of the femur are available. Tibia bolts and other parts may be obtained, but the physical characteristics of the metal do not permit considering devices of intricate shapes usually formed by casting.

Thus a new material is developed for the surgeon by the chemist.

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Higgins Reviews 1943

Charles A. Higgins, president of Hercules Powder Company, states in his 1943 review that postwar chemical industry will employ considerably more workers than in prewar years and that the war has accelerated the development of chemical industry. Some of the so-called substitutes are better than the materials they have replaced, and they will play a prominent part in raising the postwar standard of living.

Dolan Elected President

George W. Dolan has been elected president of Mathieson Alkali Works, Inc., to succeed E. M. Allen, retired. Mr. Allen will continue as chairman of the board. Mr. Dolan was elected executive vice-president of Mathieson in 1941.

Reid with Corn Products

Ernest W. Reid, F.A.I.C., former chief of the Chemicals Branch of the War Production Board, was elected vice-president in charge of research and development for the Corn Products Refining Company, New York, N. Y.

Egloff Speaks in Louisiana

Gustav Egloff, F.A.I.C., addressed the Baton Rouge Section of The American Chemical Society on "Petroleum in the War and Postwar Period," at its meeting on December sixteenth. He also spoke on the same subject before a joint meeting, on December seventeenth, of the Louisiana Chemical Society, The American Institute of Chemical Engineers, and members of the American Institute of Chemists, at Tulane University, New Orleans.

Containers for Food For Export

C. Olin Ball, F.A.I.C.

Technical Director, Owens-Illinois Can Company

WITH tens of millions, perhaps hundreds of millions, of people to be fed in the near future through the efforts of the United Nations Relief and Rehabilitation Administration, and with a stock pile of food alarmingly inadequate for the task, it behooves everyone concerned to consider the manner in which food can be transported without waste to the points where it is needed.

While production and distribution of food for liberated countries probably cannot be planned to provide a balanced diet, it will nevertheless be incumbent upon us to preserve to the greatest possible extent the nutritive qualities of foods that are processed.

Well planned investigations are in progress to obtain information on how to preserve vitamins in food during processing, packaging, and storing. Various agencies of the United States government are concentrating on this problem in respect to dehydrated foods, and a project applied to heat-sterilized foods is being carried on in the Universities of Chicago, Wisconsin, Arizona, and Texas; and in Pennsylvania State College under the sponsorship of the National Canners Association and the Can Manufacturers Institute. A corollary investigation, being conducted by can manufacturers and canners amounting in essence to a part of the processing studies, is a study of containers for processed food.

The containers used for food should be capable of carrying food to its destination without waste and without permitting deterioration in quality. The choice of materials for containers should depend on the risk of food-loss in relation to the supply of the critical materials that are used in making the containers.

Specifically, the following question must be answered.

> Question No. 1. Will more suffering result from consumption of critical materials in making containers than from the losses in food value that will, or are likely to, be suffered from using inferior containers that can be produced with a saving in critical raw materials?

The ideal continer for food to be shipped overseas is the hermetically

sealed tin plate container. Were it not for the present critical situation in respect to supplies of tin, rubber, and steel, this type of container would be used to the practical exclusion of all others.

The tin situation will dominate the choice of types of containers. Second in importance will be the steel situation. Since steel will continue to be less critical than tin, let us attempt to explain a logical attack on the problem from the standpoint of the tin influence alone.

The true answer to question No. 1 will change daily, according to the course of the war. Assuming to be correct the oft repeated statement that two years will elapse after the recapture of Burma and the Malay Archipelago before a normal flow of tin to this country will be resumed, we must approve the attitude of the War Production Board in husbanding the stock pile with the goal of making it last through 1948.

Should fighting in Europe cease early in 1944, as some people believe it will, we should probably witness an abrupt change in the calculations of the War Production Board. Every week by which the European war is reduced in length from that which is estimated by the most pessimistic estimators, who expect its end about one year hence, will produce change in the plans in respect to the conservation of tin. On the present basis of figuring, a continuing reduction in the use of tin for food containers appears necessary. Every feasible substitute, therefore, must be employed.

Substitutes for Tin

First among the substitutes for tin are baked non-metallic, non-vitreous coatings, commonly known to canners and can manufacturers as "enamel" coatings. These are being employed extensively to provide protection against corrosion of the steel plate of containers—to compensate for the loss of resistance to corrosion suffered through reduction in the thickness of tin coating on the plate.

In the case of heat sterilized food, these coatings are used on both the inside and outside surfaces of the cans; in the case of dehydrated food (the other type of food which is shipped abroad in large quantities) enamel coatings are used on the outside surfaces, and in special instances only, on the inside surfaces.

For dehydrated foods, another substitute for tin and for the metal can, is fiber combined with laminating materials of various kinds, including metal foil. Fiber containers for use in export shipment of food must be regarded distinctly as substitute containers because they are very costly if they approach satisfactory performance. Unfortunately, such containers have been used in some instances without adequate preliminary testing for suitability to preserve the quality of the food, and losses have been sustained because of failure of

the containers.

When used in supplying our armed forces, even tin plate containers have failed on some occasions through corrosion due to the rigors of the elements to which the containers were exposed.

Problems in Packaging

It has been said by influential persons who know the facts about the food situation that the demands for food for relief to prevent violent upheavals among the liberated peoples will put such a strain on available food supplies and distribution facilities that nobody will have time to think about the nutritive value of the food that is sent. The sole object will be to deliver something to eat to hungry people.

Notwithstanding this indication, it is only good sense to endeavor to put into every package of food the maximum possible amount of nutritive value and to deliver this value to the consumer. It is plain good economics to make the package do a full job if possible. If even a part of the value of the food is lost because its package fails to function properly to preserve the food, not only food but also the materials of which the package are made are wasted to a certain extent, depending upon the percentage of loss of the original food value.

For their efficacy in preserving food, containers are appraised from the standpoints of three types of deterioration—bacterial spoilage, spoilage due to chemical reaction between the product and the containers, and deterioration due to enzymic action and to oxidation.

Bacterial Spoilage

Bacterial spoilage induced by functional failure of the container occurs in heat sterilized foods when the container is caused to leak; in dehydrated foods, when the container fails to protect the food from increase in moisture content.

Heat-sterilized food in the hands of our overseas armed forces has been lost because of bacterial spoilage when leaks developed in cans through outside corrosion. This is not expected to be a cause of loss of relief-food because the handling of this food should not meet with the difficulties that necessitate the exposure of packages of food for the armed forces to sea water and the elements of the weather. If necessary, however, means which have been worked out for protecting cans for overseas forces with outside coatings of organic materials will undoubtedly be used for cans of food going into relief channels.

Dehydrated food, if not properly protected by impervious packages, will absorb moisture to the extent which will promote growth of bacteria. Large quantities of dehydrated eggs are said to have been lost through bacterial spoilage. Although some of this spoilage may have occurred because in the dehydrating

process the moisture content of the eggs was not reduced sufficiently to prevent bacterial growth, the fact that failure of containers was a contributing factor carries an impressive warning to packagers of dehydrated food that it pays to use containers that will not transmit moisture vapor.

It is to be doubted that any fiber container, the cost of which is equal to that of a hermetic metal container of the same capacity, will prevent the passage of moisture vapor to its contents.

Chemical Reaction Between Food And Its Container

Chemical reaction between a food and its container is almost universal in canned heat-processed foods. The rate of reaction is roughly proportional to the hydrogen ion concentration of the food although other factors also influence the corrosion produced by acid foods. From foods of low acidity, the reaction is slight.

This reaction is the major factor in determining whether or not substitute plate can be used for a given food, since tin coating affords effective protection to the steel plate of the container against chemical attack by food contents. Plate with a reduced weight of tin coating has not been found suitable for some highly acid products.

Interior corrosion of a can by its food contents causes loss of food through perforation of the can or swelling of the can by hydrogen produced in the chemical reaction. When perforation occurs, the food either suffers bacterial spoilage or quickly deteriorates in palatability because of dissolved iron, enzymic action, and oxidation.

For most of the period during which food will be supplied for relief, the tin supply will be low. Thus the problems of internal corrosion of cans, as these problems are affected by economy in the use of tin, are important. Through investigations carried on cooperatively by can manufacturers, canners, and the War Production Board, information is assembled on the amount by which the life of a can is shortened when it is made of plate carrying less tin than that which was used before the war.

From this information, decisions are reached as to which, if any, type of substitute plate can be used for each variety of heat-sterilized food, with the assumption of only a reasonable risk of food-loss through failure of the can due to food corrosion.

The provisions of W.P.B. Order M-81, which controls the use of tin and steel in making cans, reflects the combined judgment of the War Production Board, the can manufacturers, and the canners as expressed through the National Canners Association. The information used in reaching these decisions is obtained from appraisal of the performance of cans made of substitute plate in resisting corrosive attack by foods

packed experimently and stored at 100 degrees F. and at ordinary room temperature.

Enzymic Deterioration and Oxidation

More important in many instances than moisture vapor transfer is the transfer of oxygen from the outside atmosphere to the dehydrated food contents of fiber containers. Containers which will transmit moisture vapor will also transmit oxygen, which promotes deterioration of flavor and accelerates destruction of some vitamins. Oxygen is the primary factor in causing the loss of ascorbic acid and beta-carotene, and perhaps some of the less well understood vitamins, from dehydrated foods in storage, as well as in promoting deterioration in flavor, odor, color, and texture.

To ensure protection of certain dehydrated foods, the United States Army Quartermaster Corps requires them to be packed in hermetically sealed metal containers. This fact may help to bring about a change in viewpoint on the part of pre-war producers of dehydrated foods, who unquestionably impaired the chances of success for the dehydrated foods industry by emphasizing economy ahead of all other factors in packaging their products.

The pre-war use of cheap paper containers that failed completely to protect the food not only from bacterial spoilage but also from loss of vitamins and of all good qualities which are important from an organoleptic standpoint was probably responsible for the fact that much dehydrated food reached the consumer unfit to eat, thus creating in consumers an antipathy toward dehydrated food in general.

To the greatest possible extent dehydrated foods should be packed in vapor tight cans. This, as already indicated, is more important for some foods than for others; nevertheless, packing in inert gas in tight containers is beneficial for almost all varieties of dehydrated food.

Oxidation is thought to be responsible for a darkening in the color of heat-sterilized canned foods in cans which are fully enameled on the inside. This occurrence is attributed to the presence of a larger quantity of oxygen available to react with the food product than is present in cans having a plain tin surface on the inside. Oxygen will first react with tin if it is permitted to do so. When tin is available for the reaction, therefore, the color of the food will be preserved.

The effect of this oxidation upon color is apparent only in light colored foods. Even in these foods, however, the quality is not noticeably impaired in any important respect by the oxidation. This factor, therefore, appears to be of minor significance from the point of view of our present discussion. It may

cause a slight reduction of vitamin content of the food, but this has not been proven.

Economic Balance Required

The principle of balance from an economic standpoint constitutes the basis on which decisions must be made as to what containers will be employed for carrying food for relief. The balance will be established through the answer to question No. 1, which may be paraphrased as follows:

> Will the saving in money or in critical materials, accomplished by using a particular substitute container, compensate for the loss of food that may be suffered in excess of that which would be sustained were a "normal" container used?

In the development of an answer to this question, several factors must be projected. These include:

1. The probable service life of the container. (Service life is the length of time during which the container will preserve the food without substantial deterioration in quality.)

2. Service life that is likely to be required.

3. Amount by which the nutriment of the food will be reduced because of using inferior containers.

Factor No. 1 will be established by review of experience and of results of experimental packs.

Factor No. 2 will be decided in accordance with the system that will be used for distributing relief food. Conjecture will play a major part in establishing this factor.

The projection of Factor No. 3 must take into consideration not only possible complete loss of the food because of complete failure of the container to protect it, but also the effect of partial loss due to the destruction of elements belonging in the category of protective factors. Since every one of the protective factors, protein, minerals and vitamins, is essential to proper nutrition, a consistent deficiency of any one of them can result in starvation. Consequently even with an abundance of the energy constituents and of most of the protective factors, starvation can occur which is manifested through the symptoms of a deficiency disease.

Unfortunately or fortunately the protective factors that are most likely to be removed from food because of improper packaging are practically confined to a small division of the group of vitamins. This may be unfortunate in that no matter what the food may be, if it suffers a loss due to improper packaging, the loss always occurs in the same elements; consequently the result always increases the ravages of the same one or two deficiency diseases. It may be fortunate in that the prevention or correction of the normal effects of the loss will be comparatively easy to accomplish by supplementing the diet with a narrow

variety of synthetic vitamins.

Any use of containers which gives results that are short of the best that would be possible is wasteful of containers as well as of food. In the present case, because of shortage of tin, a degree of wastefulness may be tolerated—particularly in dehydrated food—to ensure the delivery of the greatest possible quantity of food to stricken people.

It is not a sensible saving of critical raw material to use a package made of non-critical material, if the package is not capable of delivering the food to the consumer in edible condition. Between complete failure of the package and perfect performance there exists a point of compromise which will give sufficient benefit through conservation of tin to more than offset small losses in food value which might occur because of slight deficiencies in the performance of containers.

S.O.C.M.A. Re-elects

The Synthetic Organic Chemical Manufacturers Association reelected the following officers at its meeting held in December: President, August Merz, F.A.I.C.; First vice-president, Elvin H. Killheffer, Second vice-president, Victor E. Williams; treasurer, Ralph E. Dorland, and secretary, Charles A. Mace. This association is now located at 6 East 45th Street, New York, N. Y.

Chemists' Status Studied by A. I. C.

The American Insitute of Chemists has formed a committee to study the subject of collective bargaining of chemists. Upon the formulation of a policy, the committee will submit its findings to the membership.

Committee members are Dr. Raymond E. Kirk, chairman; Drs. E. R. Allen, F. G. Breyer, M. L. Crossley, W. H. Gardner, E. H. Northey, and Donald Price.

Chemical Sales Double 1939

Dr. J. W. Raynolds of the chemical division, War Production Board, informed the American Chemical Society recently that 1943 sales of the chemical industry will amount to $6,000,000,000, or double that of 1939.

Dorfman Joins Durite

Maurice Dorfman, F.A.I.C., formerly with Agfa Ansco Corporation, Binghamton, N. Y., is now chemist for Durite Plastics, Philadelphia, Penna.

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Howard Adler

Miami Valley
Harvey G. Kittredge

Baltimore
Maurice Siegel

December Meeting

A meeting of the National Council of The American Institute of Chemists was held on Thursday, December 9, 1943, at the offices of Universal Oil Products Company, Room 5222, 30 Rockefeller Plaza, New York, N. Y., at 4:30 p.m. President Egloff presided.

The following officers and councilors were present: Messrs.: F. G. Breyer, G. Egloff, F. A. Hessel, D. B. Keyes, R. J. Moore, R. E. Kirk, H. S. Neiman, D. Price, M. Siegel, A. Lloyd Taylor, and M. Toch. Drs. E. H. Northey, M. L. Crossley and Miss V. F. Kimball were present.

The minutes of the previous meeting were approved.

Upon motion made and seconded, Dr. B. S. Hopkins, of the University of Illinois, was elected to Life membership.

(Members elected at this meeting are included in the supplement to the roster, which will be found elsewhere in this issue of The Chemist).

A letter from Dr. Northey was pre-

sented concerning the professional status of chemists.

A resolution from the Chicago Chapter of the Institute was read, in which that Chapter strongly urged the Institute to investigate all phases of the problem of collective bargaining for chemists.

During the discussion which followed, many points regarding the subject of the professional status of chemists were brought out. Dr. Egloff stated that in discussing the matter with the National Association of Manufacturers, he found the whole subject highly complicated.

It was recommended that since there is an active movement by the labor unions to organize chemists at the present time, that the Institute should take immediate steps to study the situation.

Dr. Crossley spoke on a plan whereby the services of professional men could be amortized by industry, just as investments are amortized.

Dr. Taylor stated that prospective members of the Institute are interested in what the Institute is doing for chemists, and that interest centers around some form of recognition for the chemist before management.

After further discussion, it was agreed that it would be well to confer with other professional societies to arrange professional group action.

After further discussion, it was moved that a committee be appointed to study this question and report back to the Council at the next meeting, with a view to getting other professional groups to participate.

The following committee was appointed: Dr. R. E. Kirk, Chairman; Dr. Price, Dr. Allen, Dr. W. H. Gardner, Dr. Northey, Dr. Crossley, and Mr. Breyer.

There being no further business, adjournment was taken.

Applications for Membership

For Fellows

Arnold Belchetz
Director of Research and Development, Stauffer Chemical Company, 420 Lexington Avenue, New York, N. Y.

Alvin L. Chason
Chemist, The Coca Cola Company, P. O. Drawer 1734, Atlanta, Georgia.

Eugene L. Combs
Research Engineer, Battelle Memorial Institute, 505 King Avenue, Columbus 1, Ohio.

John C. Moore
Superintendent of Paint Plant, Sinclair Refining Company, P. O. Box 516, Marcus Hook, Pennsylvania.

Ralph T. Nazzaro
Industrial Fellow, Mellon Institute of Industrial Research, Pittsburgh, Penna.

John R. Price
Chemical Engineer, Carbide and Carbon Chemicals Corp., 30 E. 42nd Street, New York, N. Y.

Philip R. Rector
Technical Division, Carbide and Carbon Chemical Corp., 30 East 42nd Street, New York City.

Harold F. Robertson
Manager of Developments — Plastics Division, Carbide and Carbon Chemicals Corp., 30 East 42nd Street, New York, N. Y.

Walter Eaton Spicer, Jr.
Major, Chemical Warfare Service, 1614 Civic Opera Bldg., Chicago, Illinois.

Richard C. Wackher
Research Chemist, Universal Oil Products Company, Riverside, Illinois.

Roland Ward
Assistant Professor of Inorganic Chemistry, The Polytechnic Institute of Brooklyn.

For Member

George T. Collins
Chemical Engineer, Pennsylvania Salt Mfg. Co., Philadelphia, Pennsylvania.

Lawrence C. Dormuth
Chemist, Pennsylvania Salt Mfg. Co., Philadelphia, Pennsylvania.

For Associate

Vincent J. Farley
Research Chemist, Barrett Div. of Allied Chemical & Dye Corp., Edgewater, N. J.

Betty Louise McKim
Chemist, University of Chicago, Dept. of Surgery, Chicago, Illinois.

CHAPTERS

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News Reporter to THE CHEMIST, Ralph Lamenzo

Chicago

Chairman, Hilton I. Jones *Vice-chairman,* H. R. Kraybill

Secretary-treasurer, Charles L. Thomas
Universal Oil Products Company
Riverside, Illinois

Council Representative, Howard Adler

A meeting was held on December third, at Huyler's Restaurant, 310 South Michigan Avenue, Chicago. A symposium on "The Chemist Interviews the Employer" was held, in which Dr. Victor Conquest spoke on "Fifteen Years in Interviewing Applicants for Positions in a Packing Plant"; Tom Coffer discussed "The Professional Employment Agency"; M. T. Carpenter, "Petroleum Chemists and Chemical Engineers," and J. T. Weber and H. H. Pokras, students at Illinois Institute of Technology, recounted experiences in "Being Interviewed for a Position." Abstracts of these talks will be published in the next issue of THE CHEMIST.

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Chemical Developments Corporation
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Secretary-treasurer, M. R. Bhagwat
Mathieson Alkali Works, Inc.
Niagara Falls, New York

Council Representative, Arthur W. Burwell

Alternate, Lothar A. Sontag

Reporter to THE CHEMIST, Frederick Koethen

Dr. Alexander Schwarchmann, director of research of Spencer Kellogg and Company, addressed a meeting of the Niagara Chapter at the Hotel Westbrook, Buffalo, on December third.

The attendance at the dinner was characterized by having quite a few candidates for new membership. Vice President Flett presided due to the illness of President Maurice Taylor. M. R. Bhagwat, secretary-treasurer, gave a review of the status and prospects of the chapter and made an appeal for a strong organization which would be in position to help all chemists out of work if and when a period of business depression should set in.

Dr. Schwarchmann's talk was divided into two parts, the first relating to the effects of the war on the vegetable oil industry and the second to conditions in the U. S. S. R. and Poland. He first briefly reviewed the development of the vegetable oil industry, linseed, cottonseed, corn oil, etc., the economic effect of hydrogenation and the rise in importance of coconut oil for foods because of its relative freedom from rancidity. The introduction of tung oil led to great improvements in varnish making. Thus the vegetable oil industry had put itself in position to be very much embarrassed by the sudden shutting off by the war of oils from the Far East.

A triumph of research in which castor oil was converted to a tung oil substitute by reduction of a hydroxyl to a double bond was for a time made invalid by a shortage of castor oil. A new way out was developed by alcoholysis of linseed oil with glycerine or penta erithritol and combining with phthalic acid. This process serves as an ace in the hole since castor oil is again becoming available. The picture of constant change and maneuvering to meet conditions showed the vegetable oil industry to be one in which deadly routine is avoided, to say the least.

Although the speaker has lived in this country for many years, he has visited the U. S. S. R. and Poland as well as the Far East many times and has kept himself informed on the resources and to some extent the ideology of these countries. He pictured the U. S. S. R., not as a backward country, not a sort of African colony, but as an important country with one thousand years of written history brought to a temporary stagnation by the Czars. Although decidedly not a "Red", Dr. Schwarchmann gave an unusually sympathetic and plausible explanation of the Soviet plan of government and predicted that this awakened country with her tremendous resources, will be of great importance in the future whether we like it or not.

For Your Library

ENZYME TECHNOLOGY. By Henry Tauber, F.A.I.C. *John Wiley and Sons, Inc.* 1943. 275 pp. 8½" x 5¾". $3.50.

This presentation of a summary of the chemistry of enzymes and their many practical applications fills a need. The various applications of yeast for beer and alcohol and yeast for medicinal purposes are interestingly written. Various sources of alcohol are discussed at length, and theories are given. Mold fermentations for the production of citric acid, gluconic acid, gallic acid, dextrolactic acid and the penicillins are discussed.

Bacterial fermentations of the sugars, acetone-butanol, acetone-ethyl alcohol, sorbose from sorbitol as a raw material for vitamin C manufacture, fermentation of glycerol to produce dehydroxyacetone, keto gluconic acids and 2:3 butylene glycol from glucose, are touched upon. Vinegar and lactic acid production are included.

The production of enzymes from bacterial and mold growths of animal and plant sources is discussed with industrial and clinical applications.

A chapter is devoted to the enzymes of grains and malt, and the enzymes in bread making; and another to dairy products, particularly cheese. Interesting observations are made on the enzymes in the meat, egg, vegetable, and fruit industries. Pectins and their relation to enzymes in fruit juice and jelly manufacture, and the vitamin-destroying enzymes are also included. Brief chapters treat of textile, leather, and tobacco industries. The estimation of vitamins by micro-biologic methods is followed by a fair index.

The enthusiastic approach to the subject of enzymes makes the book a source of information and ideas.

Louisiana Chapter Formed

The members of The American Institute of Chemists in Louisiana have been granted a charter for a chapter to be known as the Louisiana Chapter. Acting chairman of the chapter is H. A. Levey, consulting chemist, 8127-33 Oleander Street, New Orleans.

Flett Transferred

Lawrence H. Flett, F.A.I.C., has been transferred from the Buffalo plant of National Aniline Division of Allied Chemical and Dye Corporation, to the sales department of that company in New York, N. Y. as director of the new products division.

Textile History

Ancient and Medieval Textiles and Dyes, a new history of these subjects by William F. Leggett, is being published in five sections. 1. "Ancient and Medieval Dyes", 2 "The Story of Wool", 3. "The Story of Linen", 4. "The Story of Cotton", 5. "The Story of Silk". The first section will be ready for distribution on February fifteenth, and succeeding sections will be spaced at six-month intervals. These uniform volumes may be purchased separately or as a set at a price of $2.00 each.

Perkin Medal Presented

The Perkin medal of the American Section of the Society of Chemical Industry was presented to Gaston F. DuBois, senior vice-president of Monsanto Chemical Company, in recognition of his outstanding work in applied chemistry at a meeting held January seventh at the Hotel Commodore, New York, N. Y.

Speakers included Dr. Charles A. Thomas, on the "Technical Accomplishments of the Medalist", Francis J. Curtis on the "Personal Side of the Medalist", and Gaston DuBois, who stressed the professional aspect of chemistry—"The service of chemists can only be evaluated by the service they render to their fellowmen. . . . Have we grown industrially so fast that we have neglected our duties as citizens? . . . Science is not a measure of civilization. Science is a tool."

Marston T. Bogert, F.A.I.C., presented the medal.

Wanted

CHEMIST with ceramic experience for research work including pencil lead manufacture. Post-war future assured with large manufacturer of wood cased pencils. Location Metropolitan area of New York City. Salary open. Submit all details in first letter. Address Box 11, THE CHEMIST.

Lacey Division Chemist

Harold T. Lacey, F.A.I.C., research chemist at Calco Chemical Division of American Cyanamid Company, has been appointed by that company division chemist in charge of lakes and intermediates for the dry color and printing ink trades.

Ashman with Parker

George C. Ashman, F.A.I.C., formerly research chemist at the Miner Laboratories, Chicago, is now research chemist with the Parker Pen Company, Janesville, Wisconsin.

Egloff Appointed

Gustav Egloff, F.A.I.C., was appointed a member of the Committee on Industrial Plant Opportunities of the State of Illinois, at a meeting of the Illinois Postwar Planning Commission on November twenty-second, presided over by the Honorable Dwight H. Green, Governor of Illinois.

Domestic Commerce for December 1943 carries an article by L. N. Markwood, F.A.I.C., on "Insecticides for Post War Markets."

Modern Industry carries a debate on "Should Industry Support the Science Mobilization Bill" in its September fifteenth issue. The affirmative side is represented by Senator Harley M. Kilgore; the negative, by John W. Anderson, Gary, Indiana, industrialist.

Meeting Dates

Jan. 25. Pennsylvania Chapter. Temple University, Philadelphia, Pa.

Jan. 27. Baltimore Chapter. THE AMERICAN INSTITUTE OF CHEMISTS. Loyola College, Baltimore, Maryland. Speaker, E. L. Luaces, F.A.I.C.

Feb. (date to be selected). Miami Valley Chapter. THE AMERICAN INSTITUTE OF CHEMISTS. University of Cincinnati, Cincinnati, Ohio.

Feb. 14. N. Y. Chapter, American Society of Metals. Speaker, C. E. Waring, "Fine Metal Finishes and Their Protection During Manufacture, Shipment and Storage." 2 Park Avenue, New York, N. Y.

Feb. 24. Baltimore Chapter. THE AMERICAN INSTITUTE OF CHEMISTS. Loyola College, Baltimore, Maryland.

Feb. 29. Pennsylvania Chapter. THE AMERICAN INSTITUTE OF CHEMISTS, Temple University, Philadelphia, Penna. Speaker: Dr. Ivor Griffith, president Philadelphia College of Pharmacy and Science. "Research in Pharmacy."

Mar. (date to be selected). Miami Valley Chapter. THE AMERICAN INSTITUTE OF CHEMISTS. Ohio State University, Columbus, Ohio.

Mar. 13. N. Y. Chapter, American Society for Metals. Speaker, C. G. Stephens, "The Inspection and Identification of Engineering Ma-

terials." 2 Park Avenue, New York, N. Y.

Mar. 17. New York Chapter. THE AMERICAN INSTITUTE OF CHEMISTS. 2 Park Avenue, 26th Floor, New York, N. Y. Speakers: Harold A. Swanson, National Oil Products Company, "Patents and the Chemist"; Ralph Ericcson, Commercial Solvents Corporation, "The Nitroparaffins".

Mar. 23. Baltimore Chapter. THE AMERICAN INSTITUTE OF CHEMISTS. Loyola College, Baltimore, Maryland.

Mar. 28. Pennsylvania Chapter. THE AMERICAN INSTITUTE OF CHEMISTS. Temple University, Philadelphia, Penna. Speaker: Dr. Gilbert E. Seil, F.A.I.C., and others: Symposium on Combustion.

Apr. 14. Miami Valley Chapter. THE AMERICAN INSTITUTE OF CHEMISTS. The Engineers' Club. Dayton, Ohio.

Apr. 10. N. Y. Chapter, American Society for Metals. Speaker, J. C. Mathes, "Magnesium". 2 Park Avenue, New York, N. Y.

Apr. 12-16. American Chemical Society. National Meeting.

Apr. 14. New York Chapter. THE AMERICAN INSTITUTE OF CHEMISTS. Student Medal presentation. 2 Park Ave. 26th Floor. Speaker: R. M. Baker, Westinghouse Electric and Mfg. Co., "Electronics and Its Application to Research and Development."

Apr. 27. Baltimore Chapter. THE AMERICAN INSTITUTE OF CHEMISTS. Loyola College, Baltimore, Maryland.

May . Miami Valley Chapter. THE AMERICAN INSTITUTE OF CHEMISTS. University of Cincinnati. Cincinnati, Ohio.

May 8. N. Y. Chapter, American Society for Metals. Speaker, A. A. Schawtrz, "Induction Heating." 2 Park Avenue, New York, N. Y.

May 12. New York Chapter. THE AMERICAN INSTITUTE OF CHEMISTS. Annual Business Meeting. 2 Park Avenue, 26th Floor, New York, N. Y. Speakers: W. S. Thornbill, Shell Development Company, "New Chemicals by Shell"; T. J. Thompson, Corning Glass Works, "Wartime Developments in Industrial Glass."

May 13. THE AMERICAN INSTITUTE OF CHEMISTS. Annual Meeting. Hotel Biltmore, New York, N. Y.

May 25. Baltimore Chapter. THE AMERICAN INSTITUTE OF CHEMISTS. Loyola College, Baltimore, Maryland.

June . Miami Valley Chapter. THE AMERICAN INSTITUTE OF CHEMISTS. Ohio State University. Columbus, Ohio.

July 14. Miami Valley Chapter. THE AMERICAN INSTITUTE OF CHEMISTS. The Engineers' Club. Dayton, Ohio.

SUPPLEMENT TO ROSTER

The following new members, elected since the publication of the membership of The American Institute of Chemists in the January, 1943 issue of THE CHEMIST, are listed here. Members of The Institute are asked to add this list to the roster.

Abbott, Ruth
(M.1943), *Research Chemist,* Physics Section, Calco Chemical Div. of American Cyanamid, Bound Brook, New Jersey.

Affens, Wilbur A.
(M.1943), *Chemist,* Cincinnati Testing Laboratory, War Department Ohio River Division, Mariemont 27, Ohio.

Albert, John R.
(A.1943), *Research on Battery Building,* National Lead Company, 105 York Street, Brooklyn, N. Y.

Alexander, Allen
(1943), *Senior Chemist,* Naval Research Laboratory, Anacostia Station, Washington, D. C.

Anderton, Benjamin A.
(1943), *Supervisor Bituminous Materials,* Research and Development Department, The Barrett Division, Allied Chemical and Dye Corporation, Edgewater, New Jersey.

Ashman, George C.
(1943), *Research Chemist,* The Minor Laboratories, 9 S. Clinton Street, Chicago, Illinois.

Baird, Ronald J.
(1943), *Research Chemist,* Pennsylvania Sugar Co., 1037 N. Delaware Avenue, Philadelphia, Penna.

Baldaste, Robert F.
(1943), *Head of Information Division,* Standard Oil Company (Indiana), Whiting, Indiana.

Barrick, L. D.
(1943), *Chemist,* General Aniline and Film Corporation, Grasselli, N. J.

Bauser, Clyde E.
(M.1943), *Paint Technician,* The Lowe Brothers Company, Dayton, Ohio.

Blackberg, Solon N.
(1943), *Medical Director and Director of Research,* Nutrition Research Laboratories, 4210 Peterson Avenue, Chicago, Illinois.

Blackinton, Roswell J.
(M.1943), Development. Western States Lacquer Company, Maywood, California.

Blake, John T.
(1943), *Director of Research,* Simplex Wire and Cable Company, 79 Sidney Street, Cambridge, Mass.

Blish, Morris J.
(1943), *Director of Research,* Amino Products Company, Rossford, Ohio.

Bolley, Don S.
(1943), *Head of Organic Research Department,* National Lead Company, 105 York Street, Brooklyn, N. Y.

Botti, Edmond C.
(1943), *Research Chemist,* E. I. du Pont de Nemours, 256 Vanderpool Street, Newark, N. J.

Callaway, J. B.
(1943), *Research Chemist,* E. I. du Pont de Nemours and Company, Newark, N. J.

Carodemos, Peter P.
(1943), *Associate Professor of Chemistry,* Clemson College, Clemson, South Carolina.

Chalupski, Victor
(1943,) *Chemical Engineer,* E. I. du Pont de Nemours and Company, 256 Vanderpool Street, Newark, N. J.

Chatenever, Alfred
(1943), *Chemist*, Matam Corporation, 45-17 Pearson Street, Long Island City, New York.

Clarke, Kenneth E.
(1943), *Vice-president*, Charles R. Long, Jr. Company, 1630 West Hill Street, Louisville, Kentucky.

Coleman, Anna M.
(1943), *Fellowship Assistant*, Mellon Institute of Industrial Research, Pittsburgh 13, Penna.

Cooke, Theodore F., Jr.
(1943), *Captain Corps of Engineers, U. S. A., Director of Materials Laboratory*, The Engineer Board, Fort Belvoir, Virginia.

Corbin, Nancy M.
(1943), *Research Chemist*, Universal Oil Products Company, Chicago 4, Illinois.

D'Alelio, Gaetano F.
(1943), *Director of Research*, Pro-phylac-tic Brush Company, Pine Street, Florence, Mass.

Dalton, John N.
(1943), *Chief Chemist*, Pacific Mills, Lawrence, Mass.

Dietz, James H.
(M.1943), *Chemist*, Harshaw Chemical Company, Swanson and Jackson Streets, Philadelphia, Penna.

Dobbs, Carey C.
(1943), *Industrial Specialist*, U. S. Government, Washington, D. C.

Dobkiewicz, Hedwig Marie
(1943), *Research Chemist*, Pennsylvania Sugar Company, 1037 N. Delaware Avenue, Philadelphia, Penna.

Doherty, David G.
(M.1943), *Assistant Chemist*, USDA, Eastern Regional Research Lab., Chestnut Hill, Philadelphia, Penna.

Dolid, Jacob
(1943), *Research Chemist*, Thermoid Company, Trenton, New Jersey.

Donnellon, John B.
(A.1943), Sergeant attached to Air Corps. Hq. Sq. 5th Wing, (U.S.) A.P.O. 520, c/o Postmaster, New York, N. Y.

Dorris, Thomas B.
(1943), *Research Chemist*, Franklin Research Company, 5134 Lancaster Avenue, Philadelphia, Penna.

Drewsen, Pierre
(1943), *Chemical Engineer*, The Hinde & Dauch Paper Co., Sandusky, Ohio.

Drimer, David
(1943), *Chemist*, Clover Leaf Paint and Varnish Corp., 43-43 Vernon Boulevard, Long Island City, N. Y.

Erickson, Harry John
(1943), *Chief Chemist*, Assistant Superintendent, Aurora Gasoline Company, 12800 Northampton Street, Detroit, Michigan.

Ewell, Eugene R.
(1943), *Chemist*, The Lowe Brothers Company, Dayton, Ohio.

Fahrenbach, Marvin J.
(M.1943), *Research and Development Chemist*, Calco Chemical Div. of American Cyanamid, Bound Brook, New Jersey.

Fanitzky, Johnathon B.
(A.1943), *Chemist*, Universal Oil Products Company, Riverside, Ill.

Federoff, Basil T.
(1943), *Chief Chemist*, Fraser-Brace Engineering Company, Inc., Keystone Ordnance Works, Geneva, Penna.

Field, Theodore E.
(1943), *Director of Research*, Corhart Refractories Company, 1600 W. Lee Street, Louisville 10, Ky.

Fisher, John Roberts, Jr.
(1943), *Research Chemist*, Chemical Developments Corporation, 314 West First Street, Dayton, Ohio.

Flett, Lawrence H.
(1943), *Director*, New Product Division, National Aniline Division, A. C. and D. Corporation, New York, N. Y.

Fligor, Kermith K.
(1943), *Process Engineer*, Resinous Products and Chemical Company, Bridesburg, Penna.

Friedman, Harry
(1943), *Technical Director*, Commercial Chemical Company, Kenilworth, New Jersey.

Front, Jacqueline S.
(1943), *Assistant Fellow*, Mellon Institute, Pittsburgh, Penna.

Frost, Walter S.
(1943), *Chemist and Director*, Burnham Soluble Iodine Company, Auburndale, Mass.

Gabriel, Charles L.
(1943), *Vice-president*, Publicker Commercial Alcohol Company, Philadelphia 2, Penna.

Gakenheimer, Walter C.
(M.1943), *Research Chemist*, Minerec Corporation, 3508 Fairfield Road, Baltimore 25, Maryland.

Geiser, William B.
(1943), *Chief Chemist*, Lines West, New York Central System, 541 East 152nd Street, Cleveland, Ohio.

Gelman, George
(1943), *Research Chemist*, Quartermaster Corps (Captain), QMC Subsistence Research Laboratory, 1819 Pershing Road, Chicago, Illinois.

Glaser, Milton A.
(1943), *Chief Chemist and Director of Research*, Standard Varnish Works, 2600 Federal Street, Chicago, Illinois.

Gleave, Rex O.
(M.1943), *Chief Chemist*, Inland Empire Refineries, Inc., Box 6188 Hillyard Station, Spokane, Wash.

Grim, J. Marshall
(1943), *Research Chemist*, Mellon Institute, Pittsburgh, Penna.

Gzemski, Felix C.
(1943), *Petroleum Research Chemist*, Atlantic Refining Company, Philadelphia, Penna.

Hamm, Homer A.
(1943), *Chief of Chemical Research*, Talon, Inc., 461 8th Avenue, New York, N. Y.

Hanke, Albert R.
(1943), *Research Chemist*, E. I. du Pont de Nemours and Company, 256 Vanderpool Street, Newark, N. J.

Hanslick, Roy S.
(1943), *Chemist Engineer*, U. S. Bureau of Agriculture, Eastern Regional Research Lab., Chestnut Hill, Philadelphia, Penna.

Hanson, Benjamin R.
(1943), *Assistant Director of Technical Service*, The Lowe Brothers Company, Dayton, Ohio.

Hasselstrom, K. Torsten H. A.
(1943), *Director of Research*, G. and A. Laboratories, Inc., Exley Avenue, Savannah, Georgia.

Hatfield, Leonard F.
(1943), *Research Chemist*, The Lowe Brothers Company, Dayton, Ohio.

Hauber, Edward S. (S.J.)
(1943), *Head of Chemistry Department*, Loyola College, Baltimore, Maryland.

Hayes, C. Ellwood, Jr.
(M.1943), *Senior Chemist*, Charles Lennig and Company, 5000 Richmond Street, Philadelphia, Penna.

Hechenbleikner, Ingenuin
(1943), *Research Chemist*, American Cyanamid Co., Stamford, Conn.

Hegyi, Imre Joseph
(M.1943), *Chemist*, Baker and Company, 113 Astor Street, Newark, N. J.

Holler, Albert C.
(A.1943), *Chemist*, U. S. Metal Products Company, P. O. Box 1067, Erie, Pennsylvania.

Houghton, Dorothy
(1943), *Assistant Professor of Home Economics (Chemistry)*, Teachers College, Columbia University, N. Y.

Hunter, James Hayworth
(1943), *Vice-president in Charge of Production*, Columbia Recording Corporation, Bridgeport, Conn.

Immediata, Tony M.
(M.1943), *Research Chemist*, Sharp and Dohme, Inc., Medical Research Division, Glenolden, Penna.

Jarvis, Ernest G.
(1943), *President and General Manager*, Niagara Falls Smelting and Refining Corp., 2208 Elmwood Avenue, Buffalo, N. Y.

Jones, Haydn
(1943), *Research Associate*, Clinton Laboratories, Box 1991, Knoxville 9, Tennessee.

Jones, Llewellyn
(1943), *Research Chemist*, Hizone Products, 1211 Washington Avenue, Wilmette, Illinois.

Joy, Homer van B.
(1943), *Research Chemist*, Montclair Research Corporation, 4 Cherry Street, Montclair, N. J.

Kahn, Gloria C.
(A.1943), Women's Army Corps, Fort Des Moines, Iowa.

Katz, Jacob
(1943), *Chemical Engineer*, Alrose Chemical Company, 180 Mill Street, Cranston, Rhode Island.

Keating, Kenneth J.
(1943), *Factory Manager and Technical Director*, General Paint Corporation, Tulsa, Oklahoma.

Kell, Robert W.
(M.1943), *Research Chemist*, National Aluminate Corporation, 6216 W. 66th Place, Chicago, Illinois.

Kern, Jean G.
(1943), *Manager Application Research*, National Aniline Division, Allied Chemical and Dye Corporation, Buffalo, N. Y.

Kinneberg, Ivar
(M.1943), *Research Chemist*, Universal Oil Products Company, Drawer C, Riverside, Illinois.

Koch, Fred C.
(1943), *Director of Biochemical Research*, Armour and Company, 1425 W. 42nd Street, Chicago, Illinois.

Kozak, V. J.
(1943), *Chemist*, (Technical Sales Service), American Cyanamid and Chemical Corporation, Stamford, Connecticut.

Kranz, Frederick H.
(1943), *Group Leader*, National Aniline Division of Allied Chemical and Dye Corporation, Buffalo, N. Y.

Krewson, Charles F.
(1943), *Associate Chemist*, Bureau of Agricultural and Industrial Chemistry, USDA, Chestnut Hill Sta., Philadelphia, Penna.

Kubie, William L.
(1943), *Research Chemist*, Barrett Division, Allied Chemical and Dye Corp., River Road, Edgewater, N. J.

Kumins, Charles A.
(1943), *Research Chemist*, Inter chemical Corp., 432 W. 45th Street, New York, N. Y.

Landrum, Leslie Harold
(M.1943), *Research Engineer*, Chemical Developments Corporation, 314 W. First Street, Dayton 2, Ohio.

Larmour, Harry M.
(1943), *Chief Chemist*, Yosemite Portland Cement Corp., Box 799, Merced, Calif.

La Russo, Violet
(A.1943), *Assistant Research Fellow*, Mellon Institute, Pittsburgh, Penna.

Lee, George F., Sr.
(1943), *Analytical and Consulting Chemist,* 215 Franklin Street, Johnstown, Penna.

Leeds, Morton W.
(1943), *Research Chemist,* Inter chemical Corporation, 432 West 45th Street, New York, N. Y.

Levine, Morris
(1943), *Chemist, Research and Development,* Danciger Oil and Refining Company, Box 1889, Tulsa, Okla.

Lidfeldt, Viola
(1943), *Research Chemist,* Pond's Extract Company, Clinton, Conn.

Long, James S.
(1943), *Chemical Director,* Devoe and Raynolds Company, Louisville, Kentucky.

Lower, Stewart E.
(1943), *Director of Technical Service,* The Lowe Brothers Company, Dayton, Ohio.

Mackinney, Herbert W.
(1943), *Research Chemist,* Bakelite Corporation, 230 Grove Street, Bloomfield, N. J.

Martin, James W.
(1943), *Consulting Engineer,* 111 Broadway, New York, N. Y.

Masters, Carl L.
(1943), *Supervisor,* Research Engineering, National Aniline Division, Allied Chemical and Dye Corporation, Buffalo, N. Y.

Mazzucchelli, Arthur P.
(1943), *Research Chemical Engineer,* Bakelite Corporation, 230 Grove St., Bloomfield, N. J.

Mellon, Edward F.
(M.1943), *Assistant Chemist,* Eastern Regional Research Lab., USDA, Chestnut Hill, Philadelphia, Penna.

Merchant, Paul
(1943), *Associate Chemist,* Pine Bluff Arsenal, C.W.S. Pine Bluff, Arkansas.

Minevitch, Joseph R.
(1943), *Chemical Engineer,* E. B. Badger and Sons Company, Boston, Mass.

Monks, James W.
(1943), *General Manager,* Poughkeepsie Dyestuff Corporation, 77 North Water Street, Poughkeepsie, New York.

Moore, John C.
(1943), *Superintendent Paint Plant,* Sinclair Refining Company, Marcus Hook, Penna.

Moore, Norman Hall
(1943), *Chief Chemist,* Indian Refining Company, No. 1 Havoline Street, Lawrenceville, Illinois.

Moreau, Fernand, Jr.
(A.1943), *Research Chemist,* Oakite Products, Inc., 22 Thames Street, New York, N. Y.

Morgan, Coleman P.
(1943), *Chief Chemist,* The Vulcanized Rubber Company, 5 S. Pennsylvania Avenue, Morrisville, Penna.

Morris, William N.
(M.1943), *Assistant Supervisor of Labs.,* Atlas Powder Co., Weldon Spring Ordnance Works, Weldon Spring, Mo.

Morrow, Evan R.
(A.1943), *Chemist,* Harshaw Chemical Company, Swanson and Jackson Streets, Philadelphia, Penna.

Mow, Harold G.
(1943), *Group Leader Engineering Research,* National Aniline Division, Allied Chemical and Dye Corporation, Buffalo, N. Y.

Mueller, Arthur S.
(1943), *Technical Director,* Refined Products Company, Lyndhurst, New Jersey.

Neville, Harvey A.
(1943), *Head of Department of Chemistry,* Lehigh University, Bethlehem, Pennsylvania.

Newkirk, William B.
(1943), *Assistant to vice-president in charge of development,* Corn Products Refining Company, Argo, Illinois.

Ogilvie, James
(1943), *Research Chemist,* National Aniline Division, Allied Chemical and Dye Corporation, Buffalo, N. Y.

Oswald, Richard K.
(1943), *Chemist,* Lowe Brothers, E. Third Street, Dayton, Ohio.

Othmer, Donald F.
(1943), *Professor of Chemical Engineering,* Polytechnic Institute of Brooklyn, Brooklyn, N. Y.

Patton, Alva R.
(1943), E. I. du Pont de Nemours and Company, Box 71, New Brunswick, New Jersey.

Payne, Ralph
(1943), *Group Leader,* National Aniline Division of Allied Chemical and Dye Corporation, Buffalo, N. Y.

Payne, Ruth L.
(1943), *Chief Chemist,* Connecticut Telegraph and Elec. Div., Great American Industries, Inc., Meriden, Connecticut.

Peabody, William A.
(1943), *Research Director,* Valentine's Meat-Juice Company, 1600 Chamberlayne, Richmond, Virginia.

Polakoff, Nathan
(M.1943), *Chemist,* Woodand Selick, Inc., 36 Hudson Street, New York, N. Y.

Pollock, Dorothy L.
(M.1943), *Chemist,* Calco Chemical Division of American Cyanamid, Bound Brook, N. J.

Prebluda, Harry J.
(1943), *Development Biochemist,* U. S. Industrial Chemicals, Inc., 60 East 42nd Street, New York, N. Y.

Prosser, William R.
(1943), *Junior Assistant Plant Superintendent,* Kirkman and Son, Div. of Colgate-Palmolive-Peet Co., 215 Water St., Brooklyn, N. Y.

Raimond, William A.
(1943), *Research Chemist,* Calco Chemical Div., American Cyanamid Co., Bound Brook, N. J.

Redfern, Sutton
(1943), *Research Chemist,* The Fleischmann Lab., Standard Brands, Inc., 810 Grand Concourse, N. Y.

Rich, Paul C.
(1943), *Chemical Engineer,* Western Precipitation Corp., 1016 W. 9th St., Los Angeles, Calif.

Richards, George H.
(1943), *Group Leader,* National Aniline Division of Allied Chemical and Dye Corporation, Buffalo, New York.

Riener, Thomas W.
(A.1943), *Assistant Chemist,* Resinous Products and Chemical Co., Bridesburg, Philadelphia, Penna.

Riley, William C.
(A.1943), *Bacteriological Chemist,* Crown Cork and Seal Company, Baltimore, Maryland.

Royal, Lester
(1943), *Senior Research Chemist,* Amino Products Company Division of International Minerals and Chemical Corporation, Rossford, Ohio.

Russell, Maurice
(A.1943), *Chemist,* Harshaw Chemical Company, Swanson and Jackson Streets, Philadelphia, Penna.

Santoro, Wilfred E.
(1943), *Chief Chemist,* Standard Varnish Works, Elm Park, S. I., New York.

Sawyer, Frederick
(M.1943), *Chemical Engineer,* American Cyanamid Company, Stamford, Conn.

Schaefer, K. T.
(1943), *Superintendent of Textile Laboratory*, North American Rayon Corp., Elizabethton, Tennessee.

Scott, Cecil E.
(1943), *Patent Engineer*, Union Carbide and Carbon Corporation, New York, New York.

Seeger, Doris R.
(M.1943), *Research Chemist*, Calco Chemical Division, American Cyanamid Co., Bound Brook, N. J.

Shepard, Bernard J.
(1943), *Chemical Division Manager*, Packing Products Company, 271 Church Street, New York, N. Y.

Siggia, Sidney
(M.1943), *Research Fellow*, Polytechnic Institute of Brooklyn, Brooklyn, New York.

Sklarew, Samuel
(1943), *Chemical Engineer, Project Leader*, Ralph L. Evans Associates, 250 E. 43rd Street, New York, N. Y.

Sleichter, George M.
(1943), *Professor of Chemistry*, Cincinnati College of Embalming, 3202 Reading Road, Cincinnati, Ohio.

Smith, Arthur L.
(M.1943), *Research Chemist*, Polytechnic Institute of Brooklyn, Brooklyn, N. Y.

Smith, Merton B.
(A.1943), *Chemist*, General Cable Research Laboratories, Bayonne, N. J.

Spiegler, Madge M.
(M.1943), *Research Bibliographer*, Universal Oil Products Company, Chicago 4, Illinois.

Stamberger, Paul
(1943), *Senior Chemical Engineer*, Eastern Regional Research Laboratory, Chestnut Hill Station, Philadelphia, Penna.

Staub, John H.
(M.1943), *Research Chemist*, Barrett Division, Allied Chemical and Dye Corporation, Philadelphia, Penna.

Stein, Sidney J.
(A.1943), *Chemist*, Amecco Chemical Company, 75 Rockwood Street, Rochester, N. Y.

Steinberg, Ralph H.
(1943), *Chemist*, Carnegie-Illinois Steel Corp., 3426 E. 89th Street, Chicago, Illinois.

Stern, Edward
(A.1943), *Medical Laboratory Technician*, U. S. Army Medical Depot, 976 Medical Hospital Ship Platoon, Camp Kilmer, New Jersey.

Strickland, Elizabeth D.
(M.1943), *Research Chemist*, Chemical Developments Corporation, 314 West First Street, Dayton 2, Ohio.

Strouse, George C.
(1943), *Research Chemist*, National Aniline Division of Allied Chemical and Dye Corporation, Buffalo, New York.

Swain, Ansel P.
(1943), *Assistant Chemist*, U.S.D.A., Eastern Regional Research Lab., Chestnut Hill Station, Philadelphia, Pennsylvania.

Tausz, Jenoe Eugene
(1943), *Research Chemist*, L. Sonneborn Sons, Inc., 88 Lexington Avenue, New York, N. Y.

Tausz, Marta
(1943), Pierre Diamond Importing Co., 630 Fifth Avenue, New York, New York.

Taylor, Walter A.
(1943), *Assistant Director of Research*, Pond's Extract Company, Clinton, Conn.

Taylor, William
(1943), *Assistant, Chief Chemist*, R. H. Macy and Co., 47-09 30th St., Long Island City, New York.

Thompson, Wesley R.
(1943), *Technical Director*, Catalin Corporation, Fords, New Jersey.

Tomlinson, William R.
(1943), *Chemist*, Picatinny Arsenal, Dover, N. J.

Tortorici, Peter V.
(1943), *Materials Inspector*, U. S. Maritime Commission, 45 Broadway, New York, N. Y.

Treadway, Robert H.
(1943), *Associate Chemical Technologist*, Eastern Chemical Research Lab., USDA, Chestnut Hill, Philadelphia, Penna.

Tubis, Manuel
(1943), *Assistant Chemist*, U. S. Food and Drug Administration, Custom House, Philadelphia, Penna.

Udy, Marvin J.
(L.1943), *Vice-President in Charge of Research and Development*, Chromium Mining and Smelting Corporation, Sault Ste. Marie, Ontario, Canada.

Veltman, James H. F.
(1943), *Industrial Fellow*, Mellon Institute of Industrial Research, Pittsburgh, Penna.

Waldie, William A.
(1943), *Technical Director*, New Wrinkle, Inc., 314 West First Street, Dayton 2, Ohio.

Wendt, Gerald
(1943), *Science Editor*, Time Magazine, New York, N. Y.

West, Samuel R.
(A.1943), *Chemist*, Rocky Mountain Arsenal, Denver, Colorado.

Wetherbee, Burt W.
(1943), *Manager of Research*, Globe Woven Belting Company, Buffalo 6, New York.

White, Edward A.
(1943), *Instructor* Department of Chemistry, Fordham University, New York, N. Y.

Williams, Gordon M.
(M.1943), *Research Chemist*, New Wrinkle, Inc., 314 West First Street, Dayton, Ohio.

Withrow, James R.
(1943), *Consulting Chemical Engineer, Professor and Chairman of Chemical Engineering*, Ohio State University, Columbus 10, Ohio.

Woodson, Harold W.
(1943), *Assistant* in Department of Physiological Chemistry, College of Medicine, University of Illinois, Chicago, Illinois.

Yoran, Calvin S.
(1943), *Chief Chemist*, Wishnick-Tumpeer, Inc., 6200 West 51st St., Chicago, Illinois.

Young, George H.
(1943), *Senior Industrial Fellow*, Mellon Institute, Pittsburgh 13, Penna.

Ziegler, Lena R.
(1943), *Patent Chemist*, Chemical Developments Corporation, 314 W. First Street, Dayton 2, Ohio.

Zimmerli, William F.
(1943), *Vice-president*, General Aniline and Film Corporation, 230 Park Avenue, New York, N. Y.

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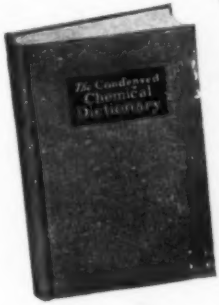

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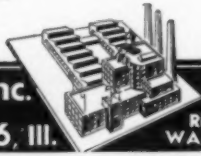

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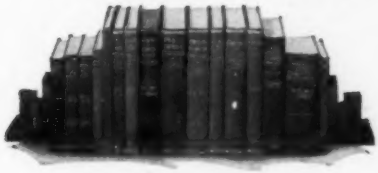

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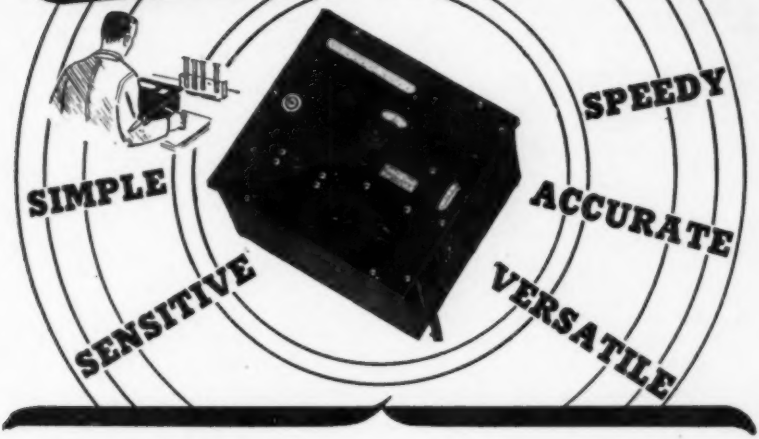

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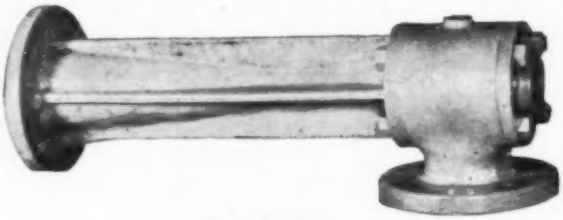

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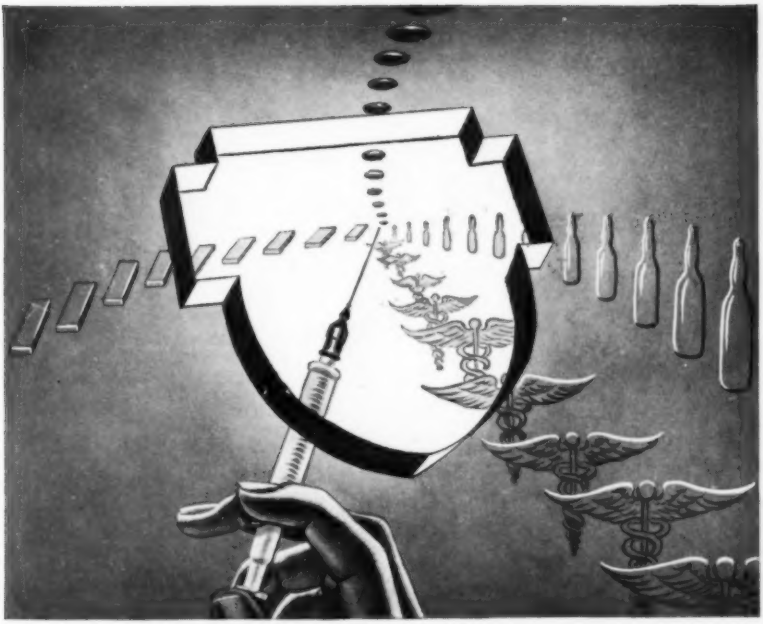

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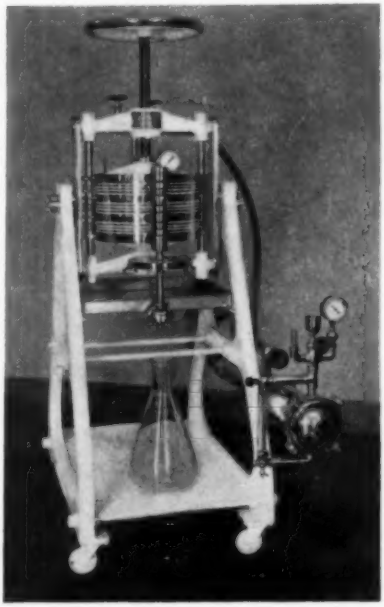

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